SÖNMEZ TRAFO

YOUR RELIABLE, INNOVATIVE, DIVERSIFIED PARTNER

Transformers and Reactors

SÖNMEZ TRAFO

Sönmez Transformer Company STS manufactures distribution, power, special transformers and reactors. The Company was founded in 1976 and is located in Gebze which is close to Istanbul. The modern transformer production plant is set up over an area 40.000m² , and is a large plant for special transformers. The plant makes use of advanced transformer/reactor manufacturing technologies based on know-how provided by ourself. The plant employs a staff of more than 90 people.STS exports almost 90% of of its products to various countries all around the world.

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TRANSFORMER TYPES WHICH WE MANUFACTURE

* Dry type F,H,C class AN, AF or AFWF cooling transformers and reactors
* Oil type (Mineral, Midel, FR3, BETA, Silicone) ONAN/ONAF/OFAF/OFWF or KNAN/KNAF/KFAF/KFWF cooling transformers and reactors
* Water cooled (ONWF, OFWF, AFWF)
* Up to 30 kHz isolating transformer for induction heating transformer
* Test transformers for Short Circuit up to 500 kA (2 s or 5 s)
* Test transformers up to 500 kV / 200 kVA (200 kV / 1000 kVA with resonance)
* Converter transformers up to 48 pulse for induction furnaces, motor drivers, rectifiers, converters
* EAF and LF transformers for steel melting up to 25 MVA
* Motor starting autotransformers for MV motors up to 15 kV and 5000kW
* Electrofilter transformers up to 150 kV 300 kVA
* Traction transformers
* Safety transformers
* Earthing transformers
* Marine transformers
* Step up/step down transformers with on load or off load tap changers
* Special dimension and environmental condition transformers for wind plants
* Serial, choke reactors
* Inductors

SÖNMEZ TRAFO

QUALITY

ISO 9001
ISO 14001
OHSAS 18001

BUREAU VERITAS
Certification

N°31877 / N°31878 / N°31879

OUR MISSION

Our mission is to be present in the transformer and reactor sector with our local capital by continuously improving and being innovative.

OUR VISION

Our vision is to be the leading company in meeting special transformer and reactor needs of our customers within our production capacities, making the production of standard distribution and power transformers efficient using modern quality techniques within standards and generating export revenues to compensate for the import costs.

OUR POLICY ON MANAGEMENT SYSTEMS

As the company STS, we meet the needs of local and international customers with regard to production and after sale services of distribution, power and special transformers. We implement.

Quality (ISO 9001), Environment (ISO 14001), Occupational Health and Safety (OHSAS 18001) management systems, comply with the relevant rules and regulations, continuously improve the efficiency of these systems.

We aim to minimise the use of natural resources and develop methods to reduce wastes.

We acknowledge and accept that maintaining occupational health and safety, preventing injuries and illnesses, keeping our impact on the environment under control, are indispensable parts of our work methods.

We think providing continuous training and education regarding environmental issues, occupational health and safety to our employees is our contribution to the society. We provide recommendations regarding environmental issues, occupational health and safety to relevant parties.

We minimise the risks for all environmental and occupational hazards with the contribution of our employees.

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QUALITY

Customer satisfaction, employee satisfaction, cooperation with our suppliers provide the basis for our goals of continuous improvement.
The management systems we implement is an initial step of total quality for our organisation hence we assume increasing efficiency and profitability by improving production and management continuously as the warranty for the future of our organisation.
We produce “PROBLEM-FREE PRODUCTS” that are open to innovations, strong, reliable without compromising quality,

DOCUMENTS IN HAND

Oil Filled Transformers
Dry Type Transformers
Converter Transformers
Reactors

STANDARDS APPLIED NORMS

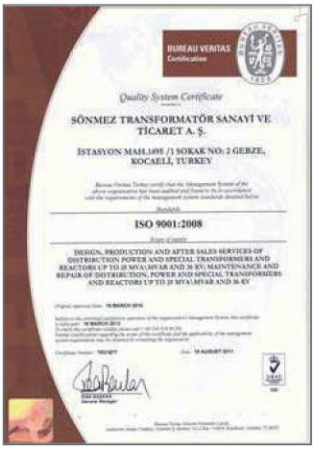
IEC 60076-1 / C57.12
IEC 60076-11
IEC 61378/ANSI C57.18.10
IEC 60076-6

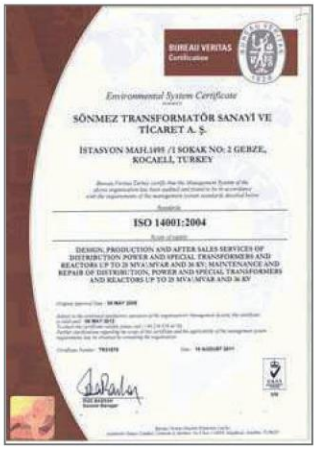
QUALITY MANAGEMENT SYSTEM
ISO EN 9001:2008

ENVIRONMENTAL MANAGEMENT SYSTEM
ISO EN 14001:2004

LABOR AND WORKER HEALTH MANAGEMENT
OHSAS 18001:2007

GOST CERTIFICATE





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CONVERTER TRANSFORMERS

6-12-18-24-36-48 Pulse

Our compact and low-weight transformers fully comply with the customers' specifications. The high quality of our reliable products provides an outstanding capacity to withstand short circuits. Special type tests and quality control ensure safe operation while STS's product support and service network guarantee free and easy use of the products.

The rectifiers used in low voltage are usually both 6- pulse or 12-pulse rectifiers, and they may be diode bridges or thyristor bridges . The 6-pulse rectifier is supplied by a two-winding transformer and the 12-pulse rectifier needs a three-winding transformer, having two separate secondary windings with 30° phase shift.

Especially with higher ratings, a higher converter pulse number is needed to limit the network harmonic distortion to an acceptable level. Pulse numbers higher than 12 require special phase shifting; multi-winding transformers or several transformers with phase shifts running in parallel.

Nowadays the pulse number of a converter system can be up to 48. This requires in total eight phase-shifted transformer windings supplying the converter system

Automotive

Drives

Fan Blower

Heavy Industry

Marine

Paper

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CONVERTER TRANSFORMERS

6-12-18-24-36-48 Pulse

Core:
The magnetic circuit is core-type with mitered joints. M5, MOH or M4 grain oriented, magnetic steel is most commonly used.

Windings:
The windings may either be copper, aluminum or mixed. Low voltage windings are always foil windings in these transformer sizes. Foil windings are mechanically extremely strong, which is important in transformers for convertor duty. An earthed screen is installed between the primary and secondary windings.

Testing:
Routine tests as per standards are conducted for each transformer unit produced. Extensive type testing programs can be performed for each design of the transformers to fulfill the requirements of the customers.

Standarts:
The following standards govern variable speed drive transformers giving the rules for correct rating, specifying and testing of transformers of that type.

- IEC 61378-1: 1997, Converter transformers, Part 1, Transformers for Industrial Applications.
- IEEE Std, C57.18.10-1998, Practices for Semiconductor Power Rectifier Transformers.

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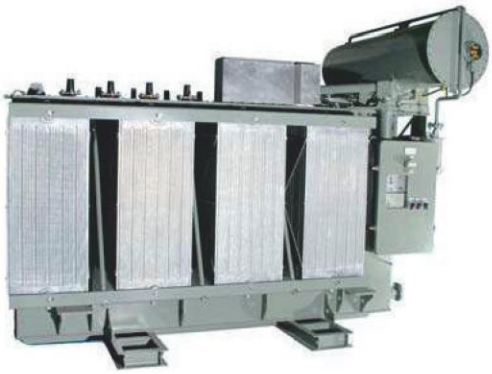
DISTRIBUTION/POWER TRANSFORMERS

The construction of a transformer comprises two active components: the ferromagnetic core and the windings. Within the transformer industry, the core and windings together are normally referred to as the “active part”. The passive part of a transformer is the cooling system, consisting of the tank and the cooling liquid (mineral oil, silicone liquid, synthetic organic esters, FR3 or Midel).



Core

The core is constructed using thin sheets of cold-rolled grain-oriented magnetic silicon steel insulated on both sides. Conventional grainoriented steel (CGO steel) is used for transformers with normal no-load loss characteristics, while transformers with reduced no-loadlosses are built using higher-quality steel (usually laser treated).

Winding

Low voltage windings are usually made of copper or aluminium sheet conductor (foil). The benefit of this is that any high voltage ampere-turn asymmetry which might occur is compensated automatically by an appropriate internal current distribution in the low voltage foil.

High voltage windings are almost exclusively of layered construction. The copper or aluminium conductors are made of one or more round or square wires, either with an insulating enamel coating or wrapped in insulating paper(according to insulating class). Each design is drawn up in accordance with the specific characteristics of the conductor material to be used.

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DISTRIBUTION/POWER TRANSFORMERS

Oil Type Transformers

Product	Power (kVA)	Primary Voltage (kV)	Features
Distribution Transformers	≤ 5000	Up to 36 kV	Used for indoor and outdoor applications, can be provided with on-load or off-load tap changers.
Large Distribution and Power Transformers	≥ 5000 ≤ 150000	Up to 220 kV	Used for indoor and outdoor applications, can be provided with on-load or off-load tap changers.

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Dry Type Transformers

Product	Power (kVA)	Primary Voltage (kV)	Features
Distribution Power Transformers	≤ 20000	Up to 36 kV	Used for indoor applications, can be provided with onload and off-load tap changers.

4100 kVA Dry Type Converter Transformer
IP 23 enclosure

2100 kVA Dry Type Converter Transformer
with IP 55 enclosure

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EAF - LF TRANSFORMERS

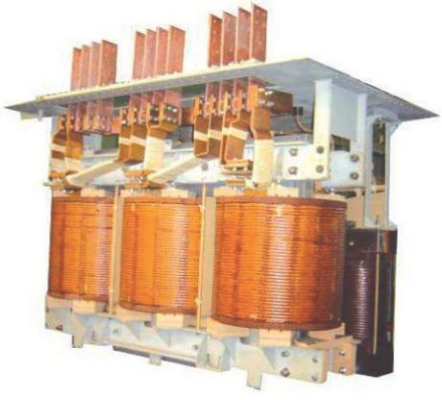
Electric arc furnace (EAF) transformers are required for many different furnace processes and applications.

They are built for:

- **Steel furnaces, mainly long arc**
- **Ladle furnaces**
- **Ferroalloy furnaces and similar with short or submerged arc**

STS is a global supplier of transformers for high-current industrial processes like aluminum electrolysis or arc furnaces for steel and other metals. Furnace transformers for AC EAF operation have a large area of applications. From the very demanding and cyclic AC steel furnace operation, with frequent short circuit conditions in the furnace, to the submerged arc operation in furnaces.These transformers have to be adequately protected against harmonics and frequent overvoltages (HV and LV sides) generated by the operation of the process, and the very high mechanical and thermal stresses have to be contained by a rigid design.

Design Requirements for AC Arc Transformers:
Managing very high secondary currents - for steel up to 90 kA and for ferroalloy up to 160 kA electrode current - and a wide secondary voltage range. The secondary voltage is normally regulated by means of an on-load tap changer (OLTC), either directly in the HV winding or in an intermediate circuit of a two-core design (booster regulation) within the transformer tank.



For extended arc operation in steel furnaces, an additional series reactor with NLTC or OLTC is optional for improved arc stability. The reactor may be built into the transformer tank or installed separately.

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EAF - LF TRANSFORMERS

	Definition	Unit
1	Power	kVA
2	System Voltage (Primary&Secondary)	kV
3	Taps	
4	Short Circuit Voltage	%
5	Phase Number	
6	Frequency	Hz
7	Transformer Type (Oil, Dry, Hermetic etc.)	
8	Transformer Cooling Type	
9	Furnace Type	
10	Vector Group	
11	Requested Losses	
12	Required Protection Devices	
13	Standarts	
14	Ambient Condition	

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EARTHING TRANSFORMERS

Earthing Transformer are used to create a neutral point in a three phase system, which provides possibility for neutral earthing. The earthing can be through an arc-suppression reactor, a neutral earthing reactor or resistor or directly.

STS is able to produce the following types:

-Oil-type: up to 100 kV

-Dry-type: up to 36 kV

-With auxiliary winding upon request

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EARTHING TRANSFORMERS

The design can be a transformer with just one winding, which is zig-zag connected. The zero sequence impedance of such a winding is normally quite low, but it can be increased if the purpose of the is to limit the current through the transformer in case of an earth fault somewhere in the power system.

An alternative conncetion to zig-zag is star/delta connection where the delta connected winding will compensate the zero sequence magnetic field so it will be confined to a leakage field between the star and the delta winding and make the zero sequence impedance of the transformer relatively small. It is possible to provide the earthing transformer with a secondary winding for continuous auxiliary station supply.

When the earthing transformer is going to be used together with an arc-suppression reactor, the rated current (and its duration) of the earthing transformer will be determined by the data for the arc-surpression reactor.

	Definition	**Unit**
1	Voltage	kV
2	Vector Group	
3	Zero Sequence Impedance	
4	Continuous Maximum Zero Sequence Current Rating	A
5	Fault duration	Sec.
6	Cooling	
7	Terminals	
8	Ambient Condition	

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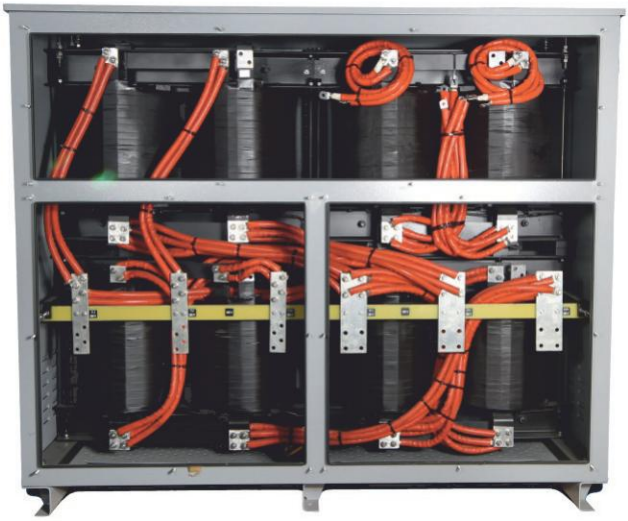
MARINE TRANSFORMERS



Sönmez Transformer(STS) designs and manufactures transformers and reactors for marine electrical propulsion systems.

STS equipment can be found on installation such as cruise liners, container vessels, oil production and military vessels.

In all cases reliability is the key issue and the reason why many ship owners, operators and system designers continually specify the STS product.

Protection enclosure ranges from IP23, to IP55 (totally sealed) combined with the required cooling arrangements such as naturally air or forced air cooling systems or air/water heat exchangers.

All this can be optimised to suit the specified vessel system in terms of power ratings, available installation space and environmental protection.

Propulsion and Marine
(up to 20 kV and 20 MVA)

Design	Application
Rectification	6,12,18, 24 Pulse Converters
Drives	HV/LV Systems, VSD, PWM
Marine Distribution	Lighting Auxillary

CLASS CERTIFICATION:

Marine Transformers manufactured by STS could be certified by class certification companies upon request. STS has many experience with different class certification companies. Some of them are:

- Türk Loydu
- Bureau Veritas
- DNV
- Lloyds Register
- RINA

- ABS
- GERMANISCHER LLOYD
- CLASS NK
- ETC.

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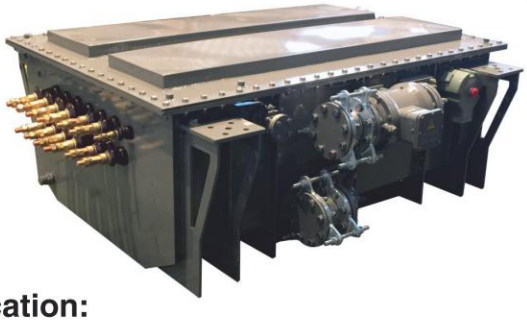
TRACTION TRANSFORMERS



Sönmez Transformer designs transformers and inductors for both wagons and locomotives. Compact and light-weighted, protected from harsh environment by self developed technology, high level of reliability.

Railway Electrification:

We have successfully developed specialized transformers used by Turkish railways up to 25 KV class in their various applications, such as:

- Auxiliary transformer of 5/10/25 & 50 KVA
- Booster transformers up to 30 KV class
- Dry type fiber glass epoxy stainless steel housed transformers for 400 V input / 400 V output
- Traction Heating systems

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REACTORS

Our compact and low - weight transformers fully comply with the customers specifications. The high quality of our reliable products provides an outstanding capacity to withstand short circuits. Special type tests and quality control ensure safe operation while STS's product support and service network guarantee free and easy use of the products.

- Serial Reactors
- Harmonic Filter Raectors
- Neutral Earthing Reactors
- Choke
- Water Cooled Reactors
- Inrush Limiting Reactors
- Shunt Reactors
- Starting Reactors
- Line/Load Reactors

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REACTORS

Neutral earthing Reactors: The application of neutral earthing reactors is to increase the impedance in the neutral point of a transformer or a shunt reactor. During single phase faults the reactor limits the fault current in the neutral and the restoration of the power line is improved. The design can be dry-type or oil-immersed.

Shunt Reactor: The shunt reactor compensates the capacitive generation on power lines to avoid non-controlled voltage rise especially on lightly loaded lines. The simple design and robust build-up makes the shunt reactor the most cost efficient mean to compensate the capacitive generation.

Smoothing Reactor: The direct current that comes from the rectifier in the DC system has superimposed harmonic components, also called ripple. The smoothing reactor is connected in series with the rectifier and the whole load current flows through it. The purpose of the reactor is to provide high impedance to the flow of the harmonic currents, reduce their magnitude and thus making the DC current more smooth.

Inrush Limiting Reactor: Damping reactors limit the inrush and outrush currents of capacitor banks. Also used in series compensation systems in the bypass/discharge circuit to limit the capacitor discharge current.

Line/Load Reactor: Reactors reduce the harmonic current dissipated by the motor speed controllers, reduce the starting current, provide silent operation for motors, limit peak current, enable fuse selection depending on nominal motor current, decreases motor temperature, reduce over voltage (dv/dt) during switch off.

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AIR CORE REACTORS

- **Current Limiting Reactors**
- **Damping Reactors**
- **Harmonic Filter Reactors**
- **Neutral Grounding Reactors**
- **Shunt Reactors**
- **Smooting Reactors**

Air Core Reactors provide a linear response of impedance versus current that is essential to numerous applications. Sonmez reactors are air cooled, single or multi-layer, cylindrically wound units constructed on weather resistant tubes with all materials chosen to meet the most severe thermal and electrical shocks and cycling requirements.

Reactor coil windings are normally designed using all aluminum construction with the conductors individually insulated. Copper winding can be provided to meet special applications.

Flat aluminum terminals are drilled to specifications unless otherwise specified to meet special customer requirements.

STS Reactors are designed and constructed to be maintenance free.

Current Limiting **Inrush Limiting** Harmonic Filtering **Compensation** Smoothing

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AIR CORE REACTORS

- **Maintenance Free Design**
- **User Friendly**
- **High Mechanical Stress**
- **Extended Service Life**
- **Decreased Losses**

	Definition	Unit
1	System Voltage	kV
2	Frequency	Hz
3	Reactance/Inductance	Ohms/H
4	Continuous Current	A
5	Short Circuit Levels	kA
6	Short Circuit Time Duration	Sec
7	Fundamental/Harmonic Frequency Levels	Hz
8	Basic Impulse Levels	kV
9	Q required for Filter Reactors	
10	Vertical or Horizantal Mounting	
11	Terminal Configuration	
12	Dimensional Specifications	
13	Number of Units	

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SCOTT-T TRANSFORMERS

Sonmez Transformer manufactures Scott-T transformers for:

-Industrial furnace transformers
-Traction systems
-Special applications

A Scott-T transformer is a type of circuit used to derice two-phase electric power 90-degree phase rotation) from a three-phase (3-*, 120-degree phase rotation) source. The Scott connection evenly distributes a balanced load between the phases of the source.

There are two main reasons for the need to transform from three phases to two phases,
1. To give a supply to an existing two phase system from a three phase supply.
2. To supply two phase furnace transformers from a three phase source.

ELECTROSTATIC PRECIPATOR RECTIFIER TRANSFORMERS

An electrostatic precipitator is a large, industrial emission-control unit.
It is designed to trap and remove dust particles from the exhaust gas stream of an industrial process. Precipitators are used in these industries:

· Power/Electric
· Cement
· Chemicals
· Metals
· Paper

Depending upon dust characteristics and the gas volume to be treated, there are many different sizes, types and designs of electrostatic precipitators. Very large power plants may actually have multiple precipitators for each unit.

STS ensures high product quality and STS makes all Quality Control Processes of the Materials and Assemblies build transformer set.

STS is able to manufacture transformer rectifier sets for electro static precipitators; up to 300kVA, 140 kV voltage, full-wave rectifier transformers.
Transformer rectifier sets have current limiting reactor input side and the current limiting resistor is used for output.
Transformer rectifier sets are generally oil immersed type and STS could produce hermetically sealed transformers.

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SPECIAL TRANSFORMERS

Custom Design Products

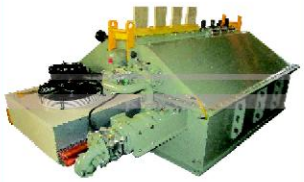
Sönmez Transformer (STS) designs and manufactures transformers and reactors for cable test, HV isolation test, Short circuit and varios special applications.

500 kVA 11kV-77 kV / 480 V
Multi-tap Transformer

100+100 kVA Scott Transformer
for Saudi Aramco

13545 kVA, 10/11kV, KFWF Oil Immersed
Marine Transformer installed
in Hamburg, Germany

3150 kVA, Multi-tap Test Transformer with motor
drive tap-changer installed in U.S.A



5000 kVA, 2400/13800 V,
Oil Immersed Transformer

40 kVA; 380/ 0...433 V,
Dry Type Test Transformer

5000 kVA, Dry Type Transformer with Ip54
enclosure for 12 Pulse Converter System

4750 kVA; 10500/400-1370 V;
Converter Transformer installed in Dubai

3500 kVA; 69/ 1,4 kV;
Converter Transformer installed in U.S.A

250 kVA, 380/190 V, Dry Type Transformer
with IP 56 for outdoor installations

280 unit of Quadrupole Magnet Coils
for SESAME Particle Accelerator

3818 kVA, 6300/6x1920 V, 36 Pulse Converter
Transformer installed in Indonesia

5070 kVA, 10000/4x1903 V, 24 Pulse Converter
Transformers for petro-chemical industry

20 kVA, Dry Type Marine Transformer with IP 56
enclosure installed on deck of research vessel.

1250 kVA, 380 / 690 V, 50 Hz, Dd0+ Ii0
Marine Transformer for Navy Project

2000 kVA, 13800/ 440-440 V ; Dyn5yn5, IP 23
Dry Type Converter Transformer
installed in Saudi Arabia

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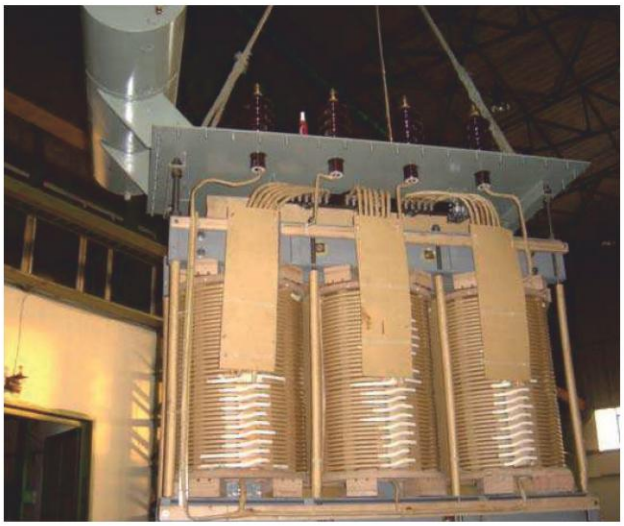
SERVICE & MAINTENANCE

Sönmez Transformer Maintenance Services offer comprehensive transformer rewind services to both primary and secondary windings. Constantly over-working your transformer may significantly reduce its efficiency and longevity of life by causing increased arcing and winding failure; resulting in electrical breakdown.



If unavoidable, our transformer winding service will follow this basic project plan:

- **On-site testing and consultation**
- **De-commissioning and removal to our in-house testing facilities**
- **De-tanking of transformer core**
- **Removal of damaged legs / coils**
- **Replacement Coil manufacture by our manufacture engineers**
- **Construction of your transformer**
- **Delivery, installation, testing and commissioning**

SÖNMEZ TRAFO

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